REMARKS

Favorable reconsideration of this application is requested. Claims 1, 2, 3, 6, 9-12, 15 and 17 have been amended. The amendments to claims 1 and 9 are supported by the original disclosure, for example by page 14, line 16 to page 15, line 1. Claims 2, 3, 6, 10-12, 15 and 17 have been amended editorially. Claims 22 and 23 are canceled without prejudice or disclaimer. No new matter has been added. Claims 1-17 are pending.

Claim Objections

Claims 22 and 23 are objected to as being of improper dependent form. The objection is rendered moot as claims 22 and 23 have been canceled.

Claims 1-3, 6, 9-12 and 15 are objected to because of informalities. The claims have been amended, taking the issues noted in the objection into account.

Withdrawal of the objections is respectfully requested.

Claim Rejections – 35 U.S.C. § 112

Claim 23 is rejected under 35 USC 112, first paragraph, as failing to comply with the written description requirement. Claim 23 has been canceled. Claim 1 has been amended to limit (X+Y) to be in a range of 30 and 50, and the amendment is supported by the original disclosure, for example by page 14, lines 23-26.

Claim 17 is rejected under 35 USC 112, second paragraph, as being indefinite. Claim 17 has been amended, taking the issues noted in the rejection into account.

Withdrawal of the rejections is respectfully requested.

Claim rejections - 35 U.S.C. § 103

Claims 1-7, 9-16, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rabbani et al. (EP 0971039) in view of Notomi et al. (Nucleic Acids Research 2000; 28(12): e63). Applicants respectfully traverse the rejection.

Claims 1 and 9 require the (X-Y)/X value to be in the range of -1.00 to 0.75, and the (X+Y) value to be in the range of 30 to 50. Claims 1 and 9 further require the {X-(Y-Y')}/X value to be in the range of -1.00 to 0.75, and the (X+Y+Y') value to be in the range of 30 to 50. The primer sequences required by claims 1 and 9 provide highly specific amplification in a short period of time. For example, as shown in the following table that includes the experimental results of Examples 1, 2 and 3 of the present specification, when the target nucleic acid is SY153, the amplification time of the primer set 2 (X = 20, Y = 0) of the comparative example is

60 minutes, while those of the primer sets 4 to 11 of the examples corresponding to those

required by claims 1 and 9 are 20 minutes or 40 minutes. Furthermore, when the target nucleic

Target	Primer	X	Y	X-Y/X	X+Y	Amplification Time(min)	Primer Set No.	Example or Comparative Example
SY153	1	20	–	–	–	Nonspecific amplification	1	Comparative Example
	2	20	–	–	–			
	3	20	0	1	20	60	2	Comparative Example
	4	20	0	1	20			
	5	20	5	0.75	25	60	3	Comparative Example
	6	20	5	0.75	25			
	7	20	10	0.5	30	40	4	Example
	8	20	10	0.5	30			
	9	20	15	0.25	35	20	5	Example
	10	20	15	0.25	35			
	11	20	20	0	40	40	6	Example
	12	20	20	0	40			
	13	20	20	0	40	40	7	Example
	14	20	20	0	40			
	15	20	20	0	40	40	8	Example
	16	20	20	0	40			
	17	20	20	0	40	40	9	Example
	18	20	20	0	40			
	19	20	20	0	40	40	10	Example
	20	20	20	0	40			
	21	20	20	0	40	40	11	Example
	22	20	20	0	40			
SY160	23	20	26	−0.3	46	90	12	Example
	24	20	20	0	40			
	25	20	26	−0.3	46	90	13	Example
	26	20	20	0	40			
M13	27	24	50	−1.08	74	Nonspecific amplification	14	Comparative Example
	28	22	53	−1.41	75			
	29	24	0	1	24	90	15	Comparative Example
	30	22	0	1	22			
	31	24	6	0.75	30	60	16	Example
	32	22	6	0.73	28			
	33	24	12	0.55	36	60	17	Example
	34	22	12	0.45	34			
	35	24	18	0.25	42	40	18	Example
	36	22	18	0.18	40			
	37	24	22	0.08	46	60	19	Example
	38	22	22	0	44			
	39	24	22	0.08	46	60	20	Example
	40	22	22	0	44			

acid is M13, nonspecific amplification occurred in the case of the primer set 14 (X + Y = 74, 75) of the comparative example in which X + Y exceeded 50, while the amplification times were 40 minutes or 60 minute in the primer sets 16 to 20 of the examples corresponding to those required by claims 1 and 9.

Rabbani teaches FC and RC primers that give (X-Y)/X value of 1 and (X+Y) values of 19 (19+0=19) and 20 (20+0=20), respectively. On the other hand, claims 1 and 9 require primers that give (X-Y)/X values in the range of -1 to 0.75 and (X+Y) values in the range of 30 to 50 in the absence of an intervening sequence. Nothing in the reference teaches or suggests limiting (X-Y)/X and (X+Y) or (X+Y+Y') as required by claims 1 and 9, let alone provides any reason to limit the range of the {X-(Y-Y')}/X or the (X-Y)/X value and the (X+Y) or (X+Y+Y') value depending on the absence or presence of an intervening sequence within the primer so as to achieve efficient amplification. Accordingly, claims 1 and 9 and the dependent claims therefrom are patentable over Rabbani.

The rejection notes that Notomi teaches that the primers used in the method have an intervening sequence between the Ac' region and the B' region, and then contends that since the complementary region of the primers of Rabbani is 19 or 20 bases, separation of the two regions bound by the two portions of the primers by 40 nucleotides suggested by Notomi would result in (X+Y) values of 59 and 60. On the other hand, claims 1 and 9 require the (X+Y) value to be in a range of 30 to 50. Nothing in Notomi teaches or suggests limiting the range of (X+Y) as required by claim 1, much less any reason to expect that superior amplification enjoyed by the present invention, demonstrated for example in the experimental work of the specification, could be achieved. In fact, as noted in the rejection, Notomi teaches values greater than 40 nucleotides, and therefore, the reference leads away from the (X+Y) values as required by claim 1.

The rejection then refers to primer sets 6-11, 19 and 20 and contends that amplification efficiency decreases when X+Y is greater than 35. However, as indicated above, when the target nucleic acid is SY153, the amplification time of the primer set 2 (X-Y/X = 1; X+Y = 20) of the comparative example is 60 minutes, while those of the primer sets 4 to 11 of the examples corresponding to those required by claims 1 and 9 are 20 minutes or 40 minutes. Furthermore, when the target nucleic acid is M13, nonspecific amplification occurred in the case of the primer set 14 (X + Y = 74, 75) of the comparative example in which X + Y exceeded 50, while the amplification times were 40 minutes or 60 minute in the primer sets 16 to 20 of the examples

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corresponding to those required by claims 1 and 9. Accordingly, Applicants respectfully submit that the showing of unexpected results is commensurate in scope with the claims.

Claims 8 and 17 are rejected under 35 USC 103(a) as being unpatentable over Rabbani et al. in view of Notomi et al. and further in view of Kool, E.T. (Current Opinions in Chemical Biology (2000) 4: 602-608). Applicants respectfully traverse the rejection.

Rabbani and Notomi have been distinguished above. Kool does not remedy the deficiencies of Rabbani and Notomi. Therefore, claims 8 and 17 are patentable over the references taken alone or together. Applicants do not concede the correctness of the rejection.

Favorable reconsideration and withdrawal of the rejection are respectfully requested.

In view of the foregoing, favorable reconsideration in the form of a notice of allowance is requested. Any questions or concerns regarding this communication can be directed to the attorney-of-record, Douglas P. Mueller, Reg. No. 30,300, at (612) 455.3804.
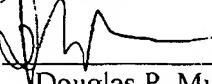
Respectfully submitted,

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